

ABSTRACT

**MUTANT FATTY ACID DESATURASE  
AND METHODS FOR DIRECTED MUTAGENESIS**

[0094] The present invention relates to methods for producing fatty acid desaturase mutants having a substantially increased activity towards substrates with fewer than 18 carbon atom chains relative to an unmutagenized precursor desaturase having an 18 carbon chain length specificity, the sequences encoding the desaturases and to the desaturases that are produced by the methods. The present invention further relates to a method for altering a function of a protein, including a fatty acid desaturase, through directed mutagenesis involving identifying candidate amino acid residues, producing a library of mutants of the protein by simultaneously randomizing all amino acid candidates, and selecting for mutants which exhibit the desired alteration of function. Candidate amino acids are identified by a combination of methods. Enzymatic, binding, structural and other functions of proteins can be altered by the method.